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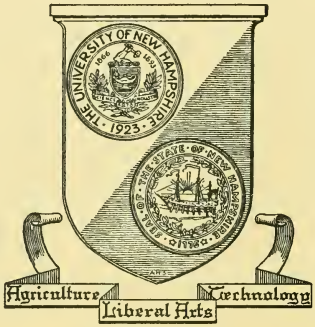

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The Use and Management of Mow Driers and Grass Silage Facilities on a Few Farms *

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A LIMITED NUMBER of New Hampshire dairymen have carried out aggressive land-management programs for a period of years. They have made heavy applications of lime and fertilizer and have made frequent reseedings with legume grass mixtures. The result has been not only a large increase in production of roughage on all acres of the farm, but this large total tonnage of hay is of higher quality, matures much earlier, and is more difficult to cure than the ordinary hay of a decade ago.

To obtain the highest feeding value from this roughage, the operators must complete the harvest of the first crop at an early date. Unfortunately the weather previous to July 1 is usually unfavorable for field drying hay. Thus, as dairymen bring a larger proportion of their crop acres under crop-improvement practices, they become increasingly concerned with this problem of harvesting a large crop of heavy, slow-drying, early-maturing hay. Many have installed additional silo capacity and are harvesting the heaviest hay as grass silage. A few have installed mow hay driers. The operators who have these new facilities are faced with management decisions as to their most economic use.

This project was initiated to study the management problems associated with harvesting hay where the operator had facilities for grass silage, mow cured hay, and field cured hay.

The study was confined to detailed observations of haying operations on a limited number of farms. These case studies in the 1949 and 1950 seasons indicated a wide variation in the use and management of roughage storage facilities. Two operators, for instance, were especially aggressive in using their available silo capacity to harvest the earliest heaviest grass in June before the usual season begins. When the silos were full, these operators continued their harvest operations, storing the hay in mows equipped with driers or in mows not so equipped. A few, even though equipped with silos and mow driers, did not begin their harvest until July.

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*Two research mimeographs were published as progress reports: Agricultural Economics Research Mimeograph No. 5, **A Description of Mow Hay Driers on 23 New Hampshire Farms in 1948**; and Agricultural Economics Research Mimeograph No. 7, **Management Problems Associated with Mow Drying Hay on Five Farms.**

No attempt was made to appraise the financial gain or loss from the use of hay drying equipment. Very little quantitative data were obtained that can be used in such an analysis. The operators were following conservative practices in the use of equipment new to them. The hay hauled to the mow driers was usually pretty well field cured. Thus, on one farm the handling of hay in the field, including the length of time of field curing, was the same whether hauled to the ordinary mow or to the mow drier. Hay which had been rained on was usually completely field cured before putting in the drier. Thus full advantage may not have been taken of the availability of the special equipment.

On the other hand, there is some evidence of a qualitative nature that the availability of the drier tended to speed up harvesting. While the operators were cautious about putting very damp hay on the drier, it is thought, based on observations, that some of them did begin hauling a little earlier and at times continued operations a little longer when faced with decisions as to the proper stage of drying to store. Also, it is thought that the operators were more willing to take risks in mowing down a larger acreage of hay at one time.

The mow driers may not have altered the total man hours involved in harvesting hay, but they may have enabled the operators to use their available labor and equipment to greater advantage. Thus they may have started haying at an earlier date, pushed haying more continuously, and completed the harvest a few days earlier.

In the 1951 season the study was limited to observations on two large dairy farms. The two operators had made considerable progress in adjusting to the new facilities. Both stored roughage in three ways: as grass silage, as mow dried hay, and as field cured hay. Both were equipped with field balers but not field choppers, and this should be taken into account when appraising the differences in man hours spent in harvesting grass silage as compared to hay. It should be noted that the grass silage was made in the early season when hay drying would be difficult. More labor was used per ton (dry hay equivalent), but the grass was harvested in a slack period before the usual hay harvest and was accomplished by available labor and equipment. Both men thought they had sufficient volume of hay to warrant the ownership of a baler. The important factor is that both operators used their available labor, equipment, and facilities to harvest and store their roughage with a combination of practices: grass silage, mow dried hay, and field cured hay. One operator completed the harvest of his first crop of 157 tons by July 15. The other had harvested 63 percent of his first crop of 220 tons by that date. Descriptions of the harvest on these two farms follow.

Hay Harvest Management on Farm No. 1

THIS FARM has 58 acres in heavy legume hay. In the 1951 season 57 acres were cut twice. The total yield, including 15½ acres of the first crop harvested as grass silage, was approximately 225 tons dry hay equivalent or 3.9 tons per acre. The first crop yielded 157 tons and the second crop 68 tons. Fifty-seven tons of the first crop and 41 tons of the second crop were mow cured. Fifty-five tons of the

DISTRIBUTION OF FIRST CROP ACCORDING TO DATE OF HARVEST

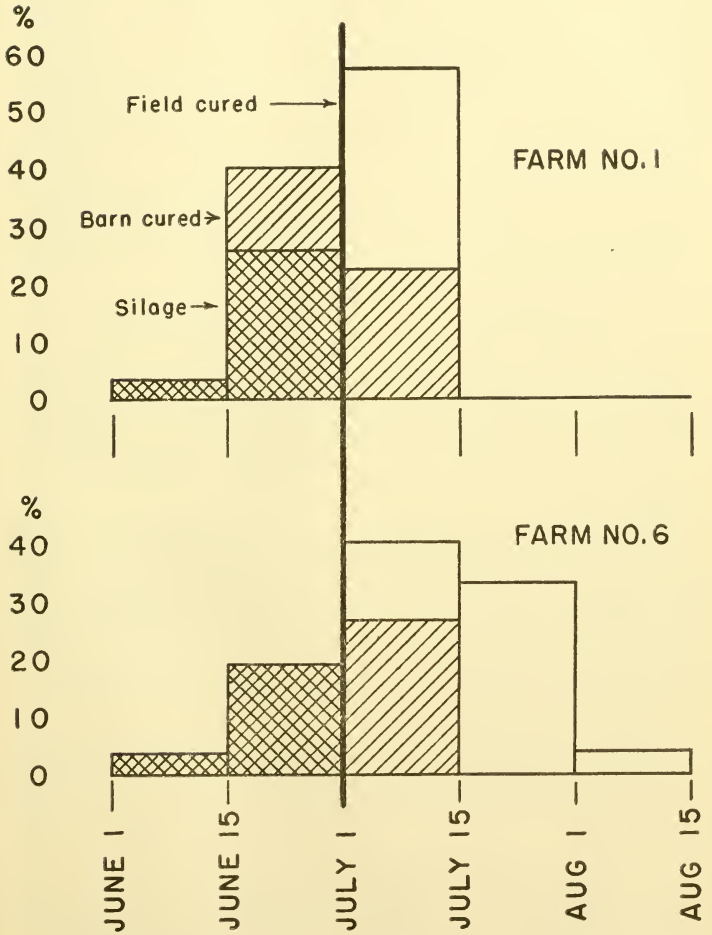

Figure 1. Forty-three percent of the first crop on Farm No. 1 was harvested prior to July 1.

first crop and twenty-seven tons of the second crop were field cured. (Figure 1.)

The 135 tons of silage (45 tons dry hay equivalent) were harvested in the period June 12 to June 30. Thus the operator harvested 29 percent of his first crop roughage as silage before the first of July. Toward the end of June he put 879 bales (approximately 22 tons) on the mow drier. It is doubtful if the operator would have attempted to harvest the heavy legume hay in 1951 at this early date without the drier. Note that the harvest of hay as silage and as mow dried hay before July 1 accounts for almost 43 percent of his total first crop roughage. In the 1950 season, this operator took advantage of an early season, and harvested 63 percent of his first crop before July 1.

The remaining 90 tons of first cutting hay were in the barn on July 15. The mow drier was used in curing 35 tons. The availability of the drier was a factor in carrying out a program of early harvesting of hay resulting in the completion of the first cutting by the middle of July.

Harvesting Silage. The 135 tons of grass silage were hauled in 51 loads in 11 days. The usual crew was four men, although for short periods the crew consisted of two or three men. A tractor and large special trailer were used. In the field the crew members were arranged in this manner: one man driving tractor, one man on load, and two pitching on; at the silo: one man in the silo, one man feeding the blower, and two pitching off. A total of 121 man hours were spent in loading, hauling, and unloading. This is about 2.7 man hours per ton dry hay equivalent. The mowing and raking totaled only .36 man hours per ton.

Harvesting Hay. The harvesting, including baling, of 42½ acres of first crop hay yielding 112 tons took a total of 190 man hours. This is 1.7 man hours per ton and 4.5 man hours per acre. The operator usually cut from 4½ to 6 acres at a time. On the tenth of July he mowed 12 acres and on the next day employed additional men in loading, hauling, and unloading. He maintained a rate of approximately 1.3 man hours per ton with or without extra men in the task of baling, loading, hauling, and unloading. Loading and unloading was done by hand, one bale at a time.

The major difference between labor spent on silage and hay was in the loading, hauling, and unloading. Based on dry hay equivalent, the time put on hauling in silage and hay was 2.7 and 1.3 man hours per ton, respectively. Under operation conditions on the farm, silage required about twice as much labor in loading, hauling, and unloading as did hay.

Mow Drier vs. Field Curing. The operator followed the practice in 1951 of field curing hay when conditions were favorable for quick drying and storing in the ordinary mow. Whenever there was some doubt as to stage of dryness, the hay was put on the drier. Much of the hay, field-cured or barn-cured, was handled the same way.

There seems to be little or no quantitative data in the 1951 season on this farm to indicate the effectiveness and value of the mow

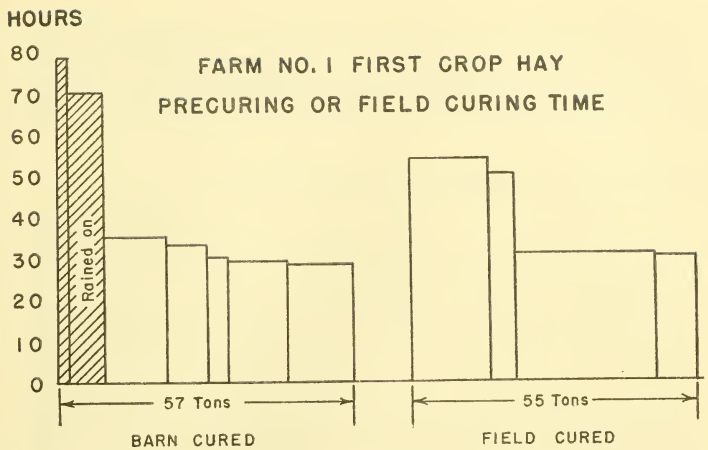

Figure 2. Type of storage made litttle difference in hours of field curing.

drier. It is thought, however, that the drier enabled the operator to complete the harvest at an earlier date. In the 1951 season all rained-on hay went on the drier. Unless rained on, no hay was out more than 54 hours. (See Figure 2.)

Second Crop. No doubt the early harvest of the first crop influenced yields of the second crop. The 57 acres of second cutting yielded 68 tons or 1.2 tons per acre. Forty-one tons were put on the mow drier and 27 tons in the regular mow. At the end of the season, there were 98 tons on the mow drier and 82 tons in the regular mow. The operator had used the full capacity of the mow drier and had put the remainder in good condition in mows not equipped with drier. The over-all harvesting time for the second crop was 2.2 man hours per ton.

Summary. The operator harvested 225 tons of hay (dry hay equivalent) with 477 man hours. The first cutting of hay put in the mow required fewer man hours per ton than the second crop, probably due to greater yields per acre. The harvesting of grass as silage took 80 percent more man hours per ton than first crop hay. On this farm no special equipment for silage was available and the operation required much hand work.

Table 1. Summary of Harvest on Farm No. 1

	Tons Dry H. Eq.	Total Hours	Hours per ton
Silage	45	136.8	3.04
First Crop	112	190.2	1.70
Second Crop	68	149.6	2.20
	225	476.6	2.12

It should be noted that the silage harvest was at a period in late June when other field work was not pressing on this farm. The available regular help were able to do the work with available equipment.

With the use of silage and mow drying facilities, in addition to the regular mow storage, this operator harvested hay early and stored it under conditions that should insure high quality.

Hay Harvest Management on Farm No. 6

THIS FARM has 131¾ acres in hay and in the 1951 season 29½ acres were cut twice. The total yield, including 21½ acres of first crop harvested as grass silage and 6 acres harvested as oat silage, was approximately 268 tons dry hay equivalent.

The first crop yielded 220 tons and the second crop 48 tons, including 16 tons dry hay equivalent oat silage. Fifty-seven tons of the first crop and 16 tons of the second crop were barn-cured, and 114 tons of first crop and 16 tons of second crop were field cured.

The 147 tons of grass silage (49 tons dry hay equivalent) were harvested in the period of June 12 to June 30. Thus the operator harvested 22 percent of his first crop roughage as grass silage before July 1 (Figure 1.) He put 171 tons of first cutting hay in the barn between July 3 and August 4.

For the curing of first cutting hay, the mow drier was used most extensively in the early part of the harvesting season. During the last half of July the weather was favorable for field curing.

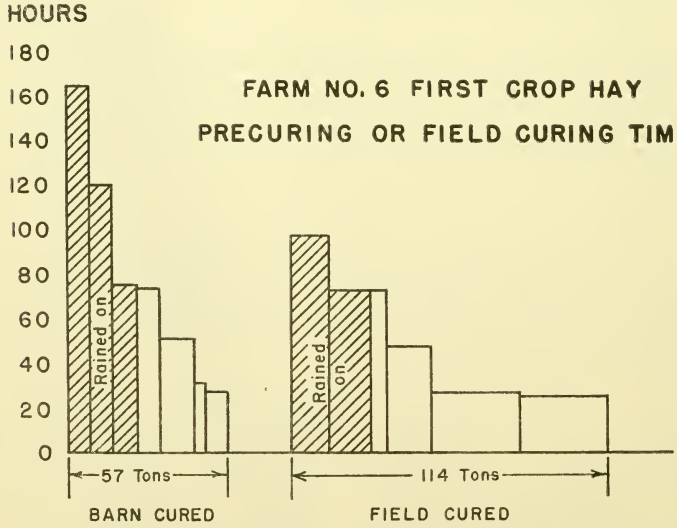

Figure 3. On this farm also, type of storage made little difference in hours of field curing.

Harvesting Silage. The 147 tons of grass silage were hauled in 43 loads in 14 days in June and the 48 tons of oat silage were hauled in 15 loads in three days in August. The usual crew consisted of three men. Crew management in the field provided one man to drive the truck, one man to pitch on, and one man on load. At the silo, two men were on load, and one was at the silage cutter.

A total of 224 man hours was spent in loading, hauling, and unloading. This is about 3.4 man hours per ton of dry hay equivalent.

Grass silage was picked up from the windrow and run in without much wilting.

Harvesting Hay. The harvesting of 104¼ acres of first-crop hay yielding 171 tons took a total of 335 man hours. This is about 2.0 man hours per ton and about 3.2 man hours per acre. The operator usually cut from 2 to 8 acres at a time. However, on July 9, he cut 12 acres and on July 10, 10 acres. This was all harvested with the usual three-man crew.

Labor spent in loading, hauling, and unloading silage and hay on this farm was 3.4 and 1.5 man hours per ton, respectively (dry hay equivalent). So here again, as in the case of Farm No. 1, about twice as much labor was used for silage in loading, hauling, and unloading as for hay.

Mow Drier vs. Field Curing. Since the mow drier was limited to one side of the barn, the operator followed the practice of field curing hay whenever conditions were favorable. With the exception of hay which was rained on, a substantial part of the field cured first crop, totaling 114 tons, was cured in the field a shorter time than most of the barn cured hay. (Figure 3.)

It should be noted, however, that the majority of field curing took place in the last half of July when weather was favorable, while the major part of the barn curing was done in the first half of July.

Thus the operator was able to use the mow drier to advantage in the early stages of the haying season when the weather was less favorable for field curing. Undoubtedly this speeded up his over-all harvest.

Second Crop. This farm cut 29½ acres of second crop hay yielding 32 tons, of which 16 tons were barn cured and 16 tons field cured. The barn cured hay was put in August 11 to 13. It was cut in the morning and placed on the drier in the afternoon. The field-cured hay (unless rained on) had to be cured at least 72 hours in the field.

A total of 84 man hours was required to harvest this 32 tons of second crop hay or about 2.6 man hours per ton. This compares with 2.0 man hours per ton for the first crop, and the additional time is no doubt due to the lower yields per acre.

Summary. This operator harvested 268 tons of hay (dry hay equivalent) with 643 man hours total time, including mowing, raking, baling, loading, hauling, and unloading.

Harvesting silage on this farm took 70 percent more man hours per ton than first crop hay, as no special field equipment for grass

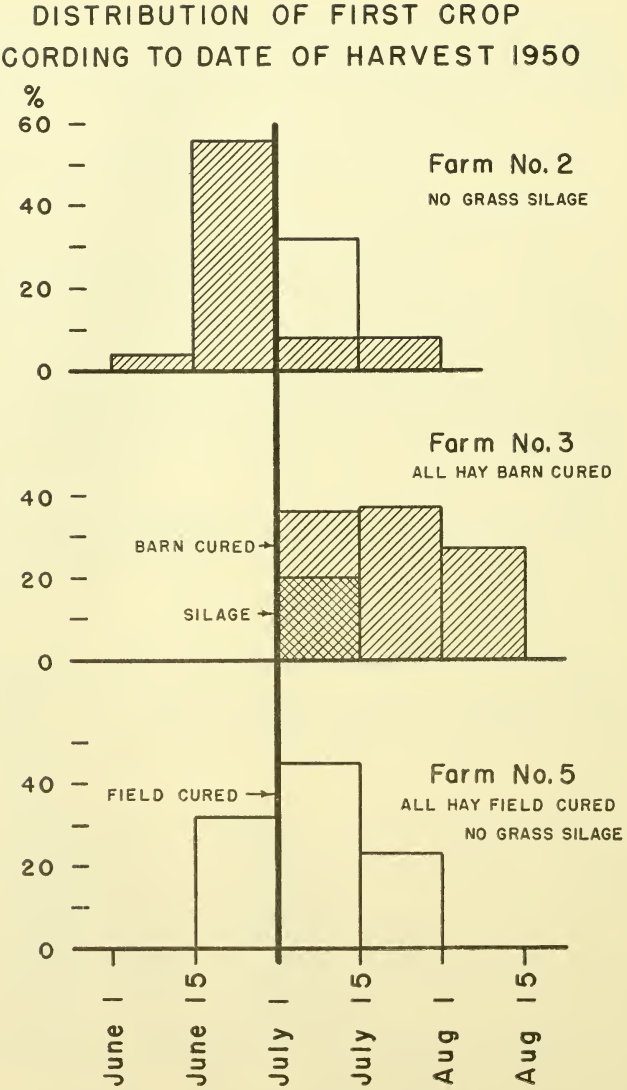

Figure 4. With the same type of equipment and facilities, the operator of Farm No. 2 had harvested 60 percent of the first crop before harvest got underway on Farm No. 3.

silage was available. Here again the grass silage was harvested in June when other field work was not pressing, and the small amount of oat silage was put in between first and second cropping.

Table 2. Summary of Harvest on Farm No. 6

	Tons Dry H. Eq.	Total Hours	Hours per ton
Silage	65	224	3.4
First Crop	171	335	2.0
Second Crop	32	84	2.6
	268	643	2.4

Harvest Management on Other Farms

THREE LARGE FARMS were selected from the list of farms studied in the 1950 season to illustrate differences in adjustment of individuals to a need for early harvest of roughage grown under a crop improvement program. There is very general agreement among research workers that the heavy, early-maturing legume crops should be harvested early to obtain the maximum feed value for dairy cattle.

Operator No. 2 harvested 114 tons of first crop hay, either as mow cured or field cured (Figure 4). He was equipped with a field chopper and two tractors. He took advantage of an early season and had 60 percent of the crop on the mow drier by the first of July; 82 percent of the crop was harvested before July 15. He might have moved the harvest forward a few days if he had put up grass silage in early June.

The operator of Farm No. 3 was also equipped with a field chopper and two tractors. He had facilities for storage as grass silage or as barn cured hay. However, he did not get under way until after July 1 and about 27 percent of the first crop was harvested after August 1. Well equipped with special machinery and with facilities, this operator had made little adjustment to an early harvest.

The operator of Farm No. 5 field cured all his hay. He had neither a baler nor a field chopper and depended on the hay loader and trucks to haul and load. With only a modest investment in special haying equipment and with a small crew, he harvested nearly a third of his first crop before July 1. He harvested three fourths of the crop by July 15 and completed the task before August 1.

Broad conclusions should not be drawn from these few individual cases. It should be noted, however, that the availability of equipment and facilities is not a significant inducement to all operators to carry out all the essential adjustments in an improved cropping program. A program to harvest the heavy, early-maturing legume hay at the best time must often begin in the previous fall. By proper planning to have the essential spring tasks accomplished by mid-June, the operator is then free to begin harvest operations at the proper time.

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